Project: American Self Storage
Location: Southwest Blvd.
Grove City, Ohio

CRITICAL STORM CALCULATIONS

PROJECT NUMBER: CW-16008
DATE: 04/29/2016

CALCULATED BY: RAB

PEAK VOLUME - UNDEVELOPED 1 YEAR STORM
HydroCAD 10.00 Results:

Volume	=	0.17	Acre-Ft.
Flowrate	=	0.68	cfs.

PEAK VOLUME - DEVELOPED 1 YEAR STORM
HydroCAD 10.00 Results:

Volume	=	0.48	Acre-Ft.
Flowrate	=	3.06	cfs.

PERCENT CHANGE IN VOLUME

$$0.48 - 0.17 = 0.31$$

$$\frac{0.31}{0.17} = 1.824 = \mathbf{182.4\%}$$

THEREFORE, BASED ON INFORMATION FOUND IN THE MORPC STORMWATER MANUAL, THE CRITICAL STORM IS A **25** **YEAR STORM**

PERCENT INCREASE IS EQUAL TO OR GREATER THAN:	AND LESS THAN:	CRITICAL STORM FOR RUNOFF LIMITATION WILL BE: (YEARS)
0%	10%	1
10%	20%	2
20%	50%	5
50%	100%	10
100%	250%	25
250%	500%	50
500%	-	100

Crossing Waters Engineering, Inc.
260 S. Main St., Suite A. / P.O. Box 27
Sugar Grove, Ohio 43155
(740) 746-0250

Project: American Self Storage
Location: Southwest Blvd.

IMPERVIOUS AREA CALCULATOR

PROJECT NUMBER: CW-16008
DATE: 05/02/2016

CALCULATED BY: RAB

Tabulation of Impervious Areas

All square footages are based on actual identification of entities within the plan, digitally provided from Autodesk - AutoCAD Civil 3D (Version 2010)

Item	Area (sq-ft)	Area (Ac.)
Prop. Building	63750.00	1.463
Parking/Sidewalk/Driveway	70436.52	1.617
	134186.52	
		3.080 Acres

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STORM DRAINAGE
REQUIRED STORAGE VOLUME

PROJECT NUMBER: CW-16008
DATE: 05/02/2016

CALCULATED BY: RAB

Difference in Increased Runoff Volume

(Based on HydroCAD 10.00 Report)

Outlet	100 YEAR (AF)	(CU-FT)	-	5 YEAR (AF)	(CU-FT)	=
Pond	1.700	74052.00		0.840	36590.40	

Proposed Retention Basin

Elev.	S.F.	Volume / Ft.			
800.00	3224	0	(Normal Pool Elevation)	=	0.00
801.00	4036	3622		=	3622.00
802.00	4919	4470		=	4470.00
803.00	5858	5381		=	5381.00
804.00	6855	6349		=	6349.00
805.00	7907	7374		=	7374.00
806.00	9016	8455		=	8455.00
806.50	9592	4651		=	4651.00
			Total	=	40302.00

	STORAGE VOLUME		
STORAGE VOLUME REQUIRED	=	37461.60	
TOTAL STORAGE VOLUME REQUIRED	=	37461.60	CU. FT.
	=	**37461.60**	CU. FT.
TOTAL STORAGE VOLUME AVAILABLE	=	**40302.00**	CU. FT.

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Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25 Monday, May 2, 2016

Pond No. 1 - Storage Volume

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 800.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	800.00	3,224	0	0
1.00	801.00	4,036	3,622	3,622
2.00	802.00	4,919	4,470	8,091
3.00	803.00	5,858	5,381	13,473
4.00	804.00	6,855	6,349	19,822
5.00	805.00	7,907	7,374	27,196
6.00	806.00	9,016	8,455	35,651
6.50	806.50	9,592	4,651	40,302

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .000	.000	.000	n/a
Orifice Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	800.00	---	---	---	---	---	---	---	---	---	---	0.000
1.00	3,622	801.00	---	---	---	---	---	---	---	---	---	---	0.000
2.00	8,091	802.00	---	---	---	---	---	---	---	---	---	---	0.000
3.00	13,473	803.00	---	---	---	---	---	---	---	---	---	---	0.000
4.00	19,822	804.00	---	---	---	---	---	---	---	---	---	---	0.000
5.00	27,196	805.00	---	---	---	---	---	---	---	---	---	---	0.000
6.00	35,651	806.00	---	---	---	---	---	---	---	---	---	---	0.000
6.50	40,302	806.50	---	---	---	---	---	---	---	---	---	---	0.000

Pond Report

Pond No. 2 - Normal Pool Volume

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 795.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	795.00	429	0	0
1.00	796.00	820	614	614
2.00	797.00	1,294	1,048	1,662
3.00	798.00	1,853	1,565	3,227
4.00	799.00	2,496	2,166	5,393
5.00	800.00	3,223	2,851	8,245

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .000	.000	.000	n/a
Orifice Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	795.00	---	---	---	---	---	---	---	---	---	---	0.000
1.00	614	796.00	---	---	---	---	---	---	---	---	---	---	0.000
2.00	1,662	797.00	---	---	---	---	---	---	---	---	---	---	0.000
3.00	3,227	798.00	---	---	---	---	---	---	---	---	---	---	0.000
4.00	5,393	799.00	---	---	---	---	---	---	---	---	---	---	0.000
5.00	8,245	800.00	---	---	---	---	---	---	---	---	---	---	0.000

Calculate Skimmer Size

Basin Volume in Cubic Feet	40,302	Cu.Ft	**Skimmer Size**	**5.0**	Inch
Days to Drain*	2	Days	Orifice Radius	**2.0**	Inch[es]
			Orifice Diameter	**4.0**	Inch[es]

*In NC assume 3 days to drain

Estimate Volume of Basin

	Length	Width				
Top of water surface in feet			Feet	**VOLUME**	**0**	**Cu. Ft.**
Bottom dimensions in feet			Feet			
Depth in feet			Feet			